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GAS President's Comments and Report from the Academy Council

On September 11, 2001, our country was struck with a heartless terror. In spite of this adversity, the spirit of America thrives and may have risen to a new height. The flags, signs, and songs are all evidence of a patriotic people who will give their all for the ideals of this nation.

At this heightened state of emotion and pride, we must be mindful of the hard work, commitment and genius that made America the great place that it is today. We can maintain our quality of life if we continue with our good works and ensure a lasting pool of highly trained and informed citizens. The Georgia Academy of Science is poised and ready to take its position as a leader in helping to train the next generation of scientists, engineers, and mathematicians. We are committed to providing our students with opportunities to explore the most advanced scientific principles while using state-of-the-art technology. We are dedicated to training and encouraging our students to employ their skills to solve the problems of our community. We will create a forum to allow students to share their research findings with some of the top scientists and students throughout the state.

Our challenge is great, but with your assistance we can do great things. The Academy needs you to reach out to a student and help her/him to become a significant contributor to our society, Together, we can help our state to do its share to produce some of the most productive citizens of the world. Finally, as the annual conference of the Academy grows near, we ask you to make plans to take a student to the conference who might have never had this experience. The conference, that will be held at Georgia College and State University, is slated to be one of the best every. The local arrangements team is working tirelessly to provide the finest of venues. The technical program director is working to ensure programs and seminars of critical significance. The Academy council is developing strategies to team with you so that we all play a more significant role in the future of science in Georgia.

We wish you a wonderful New Year and holiday season, and look forward to seeing you at the conference in March 2002.

Army Lester, President
alester@kennesaw.edu

The Georgia Science & Engineering Fair (GSEF) and the Georgia Junior Science and Humanities Symposium (GJSHS) Need Your Support

The Georgia Science & Engineering Fair (GSEF) and the Georgia Junior Science and Humanities Symposium (GJSHS) need your support. The purpose of these programs is threefold:

- to stimulate an active interest in science and engineering among Georgia's young people
- to provide students interactions with knowledgable judges and a collegiate atmosphere
- to give public recognition for exemplary independent science research completed by these students.

You can help us by doing one or all of the following:

1. PLEASE VOLUNTEER TO SERVE AS A JUDGE FOR THE GSEF. Judging is Thursday, April 11, 2002 10:00 a.m. - 7:00 p.m.

2. PLEASE VOLUNTEER TO SERVE AS A JUDGE AND/OR READER FOR THE GJSHS. Judging is on Monday, February 25, 2002 8:00 a.m. - 4:00 p.m. Abstract/Paper Readers for selection of the participants will be the week of January 15-31, 2001. Materials/abstracts will be sent to volunteers by UPS.

You may respond by visiting our Web Site at www.uga.edu/oasp and complete the judging response form(s) [Make sure that you give complete information] or you can contact Ms. Mary Lue Walser at:
mwalser@arches.uga.edu
706/542-0453
and she will mail you the detailed information and judging application forms.

THANK YOU FOR YOUR SUPPORT OF GEORGIA'S FUTURE SCIENTISTS.

A Historical Message of Current Relevance

BULLETIN OF
THE GEORGIA ACADEMY OF SCIENCE

Volume II DECEMBER, 1944 Numbers 1 and 2

The Obligation of the Scientist

"We are engaged in a war that involves technology and science and machines as no other war that men have fought has involved them. Yet we find ourselves in the amazing position of having fewer scientistists, engineers, and technologists available for employment in war related industries than we normally would have had in our peacetime industries. Furthermore, we have not provided for future needs. So far as the training of professional and technical men is concerned, the numbers now in training of professional and technical men is concerned, the numbers now in training are smaller than the numbers in training before the first World War." The technological triumphs we have achieved have been amazing. Without these triumphs our men might better have stayed home as they would have been hopelessly slaughtered without chance of victory.

It is certainly no belittlement of the courage or sacrifices of our men under arms that we supply them with the best in equipment, that we leave no stone unturned in our effort to surpass our enemy technically. And we must not allow this technical part of our strength to be bled white.

There is ample evidence that in the peace to follow the war the material need for scientists and technical men will be far greater than it has ever been before. Need, that is, from the points of view of national security and national economic stability. While this is true, there is facing us a critical shortage of scientific personnel. It has been estimated that it will be 1955 before the output of advanced scientifically trained men can become normal.

The scientist does not need to be told these things. Neither does he need to be told that, in considering postwar planning, for the future, the study of the past, however important, is not enough. The greatest attention needs to be directed toward the effects of changing techniques, new processes and new industries. Research holds the strongest hope to the future of those industries and nations actively engaged in it and is a threat to those neglecting it and its influences.

It is the obligation of every scientist not only to continue his own scientific work but to use every opportunity to aid in making this a truly scientific nation. This he must do not with any desire whatsoever of overshadowing the contributions of other fields to our national welfare and culture but to help us all become more aware of a great power which lies before us.

This is particularly true of us in the Southeast. There is no section of the country which would benefit more by an increased emphasis upon advanced scientific and technological training, by increased activity in what may be cassed the research industries.

Fortunately there is evidence that there is an increased awareness of this opportunity in our section. The recognition of the need for research and the recognition of the opportunity lying before us are primary needs. All of us are obligated to come out of our laboratories more frequently and contribute what strength and influence we have to the cause of science and technology in Georgia and the South. We of all people should be most concerned, as it is our region and our interests which are most liable to lag, yet most able to benefit. It is our duty as scientists to take an increasing part in civic and community activities and planning. We may not feel that we are experts in the social or political fields and yet if we wish society to embrace scientific thought and ideals we must contribute our thoughts and efforts as a part of society. Our contribution will benefit both state and nation.

Dr. O. R. Quayle, President
Georgia Academy of Science, 1944

SHORTER COMMUNICATION

A KEY TO THE MATURE LARVAE OF THE GEORGIA SPECIES OF ILYBIUS ERICHSON (COLEOPTERA: DYTISCIDAE)

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ABSTRACT

A key is presented for the separation of Ilybius biguttulus (Germar) and I. oblitus Sharp, the Ilybius Erichson species of record for Georgia. The mature larva of I. biguttulus Sharp has a protibial dorsal sensillum and a sharply defined anterior chevron-like marking on the frontoclypeus. The I. oblitus larva may be distinguished from I. biguttulus because it lacks the protibial dorsal sensillum and has an obscure anchor-like pattern on the frontoclypeus.

Key words: Key, Dytiscidae, Georgia, Ilybius biguttulus, Ilybius oblitus, larval morphology.

The Holarctic genus Ilybius Erichson is represented in Georgia by two species, I. biguttulus (Germar) and I. oblitus Sharp. Both species are widely distributed in eastern North America with Ilybius biguttulus (Germar) occurring from Newfoundland and Quebec to the Rocky Mountains (1) and south to Georgia (2). Ilybius oblitus Sharp occurs in the midwestern and northeastern United States with records from Louisiana, Alabama (1), Florida (3) and Georgia (4). Mature larvae of I. biguttulus were described from Newfoundland (5) with a prominent frontoclypeal marking that terminates anteriorly in a sharply defined chevron-like boundary (Fig. 1A) and with two protibial sensilla, one dorsal and one posterodorsal (Fig. 1C). Both characters have been confirmed on larvae collected from a Hancock County marsh, cultured into the adult stage, and identified as I. biguttulus. Mature larvae of I. oblitus were described based on Georgia material (6). These larvae have the frontoclypeus sparsely pigmented and with an obscure anchor-like pattern near the anterior margin (Fig. 1B). the protibia is without a dorsal sensillum but has one posterodorsal sensillum (Fig. 1D) that may appear dorsal on some larvae.

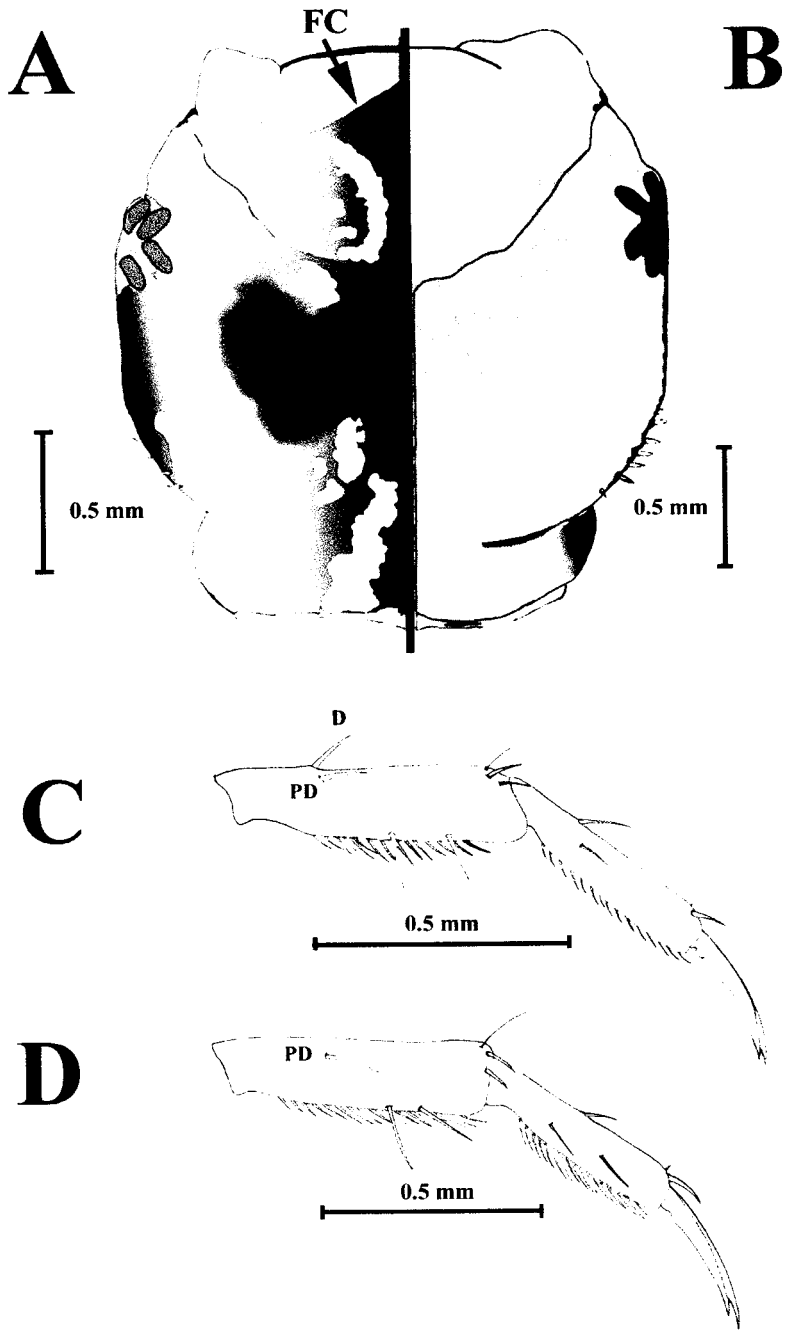

Fig. 1: Dorsal views of the head capsule of Ilybius biguttulus (A) and I. oblitus (B), showing frontoclypeal markings and posterior views of the protibiae of I. biguttulus (C) and I. oblitus (D). Abbreviations used are: FC, frontoclypeal marking; D, dorsal; and PD, posterodorsal.

Ilybius larvae are similar in appearance to those of Agabus. However, sclerotization of abdominal segment 6 is restricted to the dorsum on larvae of both species of Ilybius, resulting in an expansive lateral and ventral membranous area. In contrast, abdominal segment 6 of Agabus has a very narrow membranous area because of additional lateral and ventrolateral sclerotization (7). The result is that spiracles are located very near the margins of tergite 6 on larvae of Ilybius but are well removed from the obscure ventrolateral margins of Agabus larvae, permitting separation of the genera in Georgia (6, 8). Once identified as Ilybius, the following couplet should separate the two Georgia species.

Key to the mature larvae of Georgia species of Ilybius

1a.....Frontoclypeus with a sharply defined sub-marginal chevron directed anteriorly (Fig. 1A): protibia with two sensilla, one dorsal and one posterodorsal (Fig. 1C);.. I. biguttulus (Germar)

1b.....Frontoclypeus not as above (Fig. 1B); protibia with one posterodorsal sensillum (Fig. 1D); .....I. oblitus Sharp

ACKNOWLEDGMENTS

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LONGER COMMUNICATIONS

TEACHING COLLEGE ALGEBRA USING ONLINE SOFTWARE VERSUS THE TRADITIONAL LECTURE METHOD

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ABSTRACT

Historians consider the 20th century the beginning of the new electronic age. This electronic age opened up new horizons for the way we do business, conduct our lives, choose a career, and many other things. The teaching profession certainly did not remain immune to this electronic age. Universities started first by posting class notes on the WEB and soon after that began delivering whole courses on the Internet. At Valdosta State University we have been teaching College Algebra (MATH 1111) via the Internet for the past three years. We are using the mathematical software Interactive Mathematics by Academic Systems Corporation (ASC) to deliver the course. The course retention rate and the students' performance on the departmental final exam for the treatment group, Academic Systems method, versus the control group, traditional lecture method, were compared. Two of the six semesters, the traditional method had a statistically significant higher retention rate. While each group on occasion scored statistically significantly higher on the departmental final examination, there was no consistent treatment effect.

Key words: College Algebra, College Mathematics, Computer Uses in Education, Mathematics Education

INTRODUCTION

Winter quarter, 1998, Valdosta State University began a pilot program to study the effects of using a computer software delivery mode of instruction on achievement in College Algebra. The pilot program was a bold undertaking in many ways. The software utilized was not for drill and practice, not a tutorial, and not computer-assisted instruction (CAI), but rather the primary means of instructional delivery.

A review of the literature has failed to reveal research, which involves teaching an entire College Algebra course using computer software as the instructional

delivery. Previous studies which used computer technology on a limited basis have suggested such research be done, but integration of the computer into the College Algebra classroom has been very limited until only recently.

Ganguli (1), when using the computer for teacher demonstrations, reported a significant treatment effect on students' attitudes favoring the use of a computer as a teaching aid, leading him to conclude there was promise for the integration of technology into the teaching and learning of mathematics. Tilidetzke (2) reported no significant difference in mean scores on a posttest or a delayed posttest between CAI and traditional instruction in a College Algebra course when studying three topics of course material with two hours of computer lab time. He recommended research be undertaken using a broader range of topics presented on the computer with several levels of difficulty. The National Research Council has also recommended that computer-based curricula that are aligned with the principles of learning for understanding be identified and examined (3, 4). This study was conducted at VSU to address some of these issues.

Of particular interest to us was: (a) Would students using Interactive Mathematics as the instructional delivery method have a different retention rate in College Algebra than students in the traditional method of classroom delivery, and (b) Would students using Interactive Mathematics as the instructional delivery method perform differently in College Algebra than student in the traditional method of classroom delivery as evidenced by the score earned on the final examination.

Only one section of College Algebra was offered with the experimental format in Winter 1998 when our study began, but a limited expansion to three sections was undertaken Spring quarter 1998. Starting in the Fall of 1998 (the beginning of semester conversion in the University System of Georgia) a commitment was made to the program by the University, and the Department of Mathematics and Computer Science began offering between one-fourth and one-half of its College Algebra sections using the computer instruction method of delivery. At this time Academic Systems Corporation made access to the instructional system convenient via the Internet. This availability added an important dimension to the pilot program. Students were no longer limited to working on their lessons in a campus mathematics laboratory, but could work from their dormitory room or home.

METHODS OF COURSE DELIVERY

The most common method of teaching College Algebra is the traditional lecture method. The instructor gives a lecture and the students take notes. Here at Valdosta State University, according to departmental policy, the instructor is also required to incorporate a graphics calculator in the college algebra course.

Our treatment method of delivering the college algebra course utilized the computer software Interactive Mathematics by Academic Systems Corporation (ASC) (5). Classes either met three times a week (Monday, Wednesday and Friday) for 50 minutes or twice a week (Tuesday, Thursday) for 75 minutes. Some days the course instructor began class with a brief topic introduction. During the class period students worked on the computer while the instructor answered questions and helped students individually.

While Interactive Mathematics is designed so that students can work independently and self-paced, in order to best serve the needs of our student population,

we decided on a structured course format. At the beginning of the semester, all sections of the treatment group were given a calendar detailing which topics would be studied each week, homework deadlines, quiz dates, and examination dates. Students could work ahead of the schedule, but were not allowed to fall behind. A quiz or exam had to be taken on the scheduled date.

The lessons of Interactive Mathematics are divided into five sections, Overview, Explain, Apply, Explore, and Evaluate. In the section titled Overview, video streaming is used to introduce the concept to the student. The teaching takes place in the Explain section. There are textual screens as well as interactive screens. The Apply section requires the students to work problems and the Explore section allows the student to "explore" the algebraic concepts in application problems. The last section, Evaluate, is the quiz section (6). The computer generates parallel forms of quizzes for each student, grades the quiz, and records the score in a student's report. (The report section also records the date and time a student works on any part of a lesson.)

After completing the work online, a student would next work homework problems assigned in the text. Homework was checked to see if a student was making a sincere effort to study and learn the course material.

Both methods of delivery, Academic Systems and traditional, covered the same topics in College Algebra, see Table I. At the end of the semester the students from the Academic Systems classes and traditional classes took the same departmental final examinations.

Table I. Topics covered in College Algebra

Topics
Real Number System
Exponents and Radicals
Polynomials
Factoring
Rational Expressions
Distance & Midpoint Formulas
Equation of a Circle and Graph of an Equation
Solving Linear Equations
Applications with Linear Equations
Solving Quadratic Equations
Complex Numbers
Solving Polynomial Equations, Equations with Rational Exponents, Equations with Radicals, and Quadratic Type Equations

Table I. Topics covered in College Algebra (cont.)

Solving Linear Inequalities, and Absolute Value Inequalities
Solving Polynomial Inequalities, and Rational Inequalities
Linear Equations in the Cartesian Plan
Definitions of function, domain and range, functional notation
Analyzing Functions and their Graphs
Translations and Combinations of Functions
Inverse Functions
Quadratic Functions
Polynomial Functions of higher degree than 2
Division of Polynomials
Rational Functions and Asymptotes
Graphs of Rational Functions
Exponential Functions
Logarithmic Functions
Properties of Logarithms
Exponential and Logarithmic Equations
Applications of Exponential and Logarithmic Functions
Solving Linear Systems of Equations
Two-variable Linear Systems

DATA COLLECTION

During registration the Academic Systems classes were listed under college algebra - computer-based instruction. The two types of instruction were very distinguishable during registration, so we felt comfortable that the comparison of the retention rates would be meaningful.

At the end of each semester we collected data on the following variables: Number Enrolled, Number Taking the Final Exam, Retention Rate, Final Exam Mean, and Final Exam Standard Deviation. Table II summarizes the data.

Table II. Data Collected On the Performance of ASC vs. Traditional Method

Method of Content	Number Enrolled	Number Taking the Final Exam	Retention Rate	Final Exam Mean	Final Exam Standard Deviation	Quarter/ Semester
Lecture	634	416	65.62%	63.20	17.15	Win-98
ASC	13	9	69.23%	45.33	15.38	Win-98
Lecture	427	273	63.93%	59.81	16.70	Spr-98
ASC	57	33	57.89%	60.97	14.65	Spr-98
Lecture	877	573	65.34%	61.15	16.96	Fall-98
ASC	293	163	55.63%	65.45	15.38	Fall-98
Lecture	410	275	67.07%	52.36	17.48	Spr-99
ASC	237	159	67.09%	50.78	15.05	Spr-99
Lecture	525	363	69.14%	53.12	13.93	Fall-99
ASC	404	299	74.01%	52.40	14.31	Fall-99
Lecture	217	164	75.58%	45.05	15.89	Spr-00
ASC	179	107	59.78%	51.51	15.79	Spr-00

Every semester we compared the retention rate and the mean on the final examination between the two methods. Table III summarizes the comparison of the retention rates and table IV summarizes the comparison of the means.

Comparison 1 - Null Hypothesis: There does not exist a statistical difference between the retention rates of the two methods.

Retention rate was defined as the number of students who took the final examination divided by the number of students enrolled in the course. A two-tailed proportional z-test was used to test the null hypothesis.

Table III. Hypothesis Testing for the Retention Rate between ASC vs. Traditional Methods

	Winter 98	Spring 98	Fall 98	Spring 99	Fall 99	Spring 00
Lecture Rate	65.62%	63.93%	65.34%	67.07%	69.14%	75.58%
ASC Rate	69.23%	57.89%	55.63%	67.09%	74.01%	59.78%
Test statistic	Z= -0.2718	Z= 0.8882	Z= 2.9774*	Z= -0.0040	Z= -1.6250	Z= 3.3667*
P-value	P= 0.7858	P= 0.3744	P= 0.0029*	P= 0.9968	P= 0.1042	P= 0.0008*

Note: Negative test statistic means the mean for the Academic Systems' sections was higher.
*Means the result was statistically significant at $\alpha = 0.003$. We have enough statistical evidence to reject the null hypothesis and accept the alternative that the two retention rates are significantly different.

Comparison 2 - Null Hypothesis: There does not exist a statistical difference between the means on the final examination for the two methods.

A departmental final examination consisting of 50 multiple-choice items was administered at the end of the semester. A two-tailed t-test was used to test the null hypothesis.

Table IV. Hypothesis Testing for the Means between ASC vs. Traditional Methods

	Winter 98	Spring 98	Fall 98	Spring 99	Fall 99	Spring 00
Lecture Mean	63.00	59.81	61.15	52.36	53.12	45.05
ASC Mean	45.33	60.97	65.45	50.78	52.40	51.51
Test statistic	t= 3.0987*	t= -0.3815	t= -2.9138*	t= 0.9535	t= 0.6537	t= -3.2795*
P-value	P= 0.0021*	P= 0.7031	P= 0.0037*	P= 0.3409	P= 0.5135	P= 0.0012*

Note: Negative test statistic means the mean for the Academic Systems' sections was higher. *Means the result was statistically significant at $\alpha = 0.004$. We have enough statistical evidence to reject the null hypothesis and accept the alternative that the two means are significantly different.

CONCLUSION

From Table III, two out of the six semesters, Fall 98 and Spring 00, the traditional method had a statistically significant higher retention rate than the treatment method. We believe the statistically significant difference was due to an unusual amount of technical problems such as, server or Internet down time, lesson CD's not arriving on time. In our opinion, there is no conclusive evidence that the retention rate of one method is better than the other when viewed over several semesters.

In Winter 98 the traditional method had a statistically significant higher mean than Academic Systems. This was the first quarter that Academic Systems was used and only one class of the treatment was offered. Many lessons were learned this quarter, one of which was the need for a structured course format. From then on the treatment group scored at least as well as the traditional group. From Table IV, in Fall 98 and Spring 00, Academic Systems even had a statistically significant higher mean than the traditional method. However, as was previously noted, the traditional lecture group had a statistically significant higher retention rate both of these semesters. We believe that the students that remained in the treatment group and took the final examination were those students that were doing well in the course. Those who were not performing well in the course withdrew or dropped out of the class before the final examination was administered. This may account for the differences in the means rather than the treatment effect, traditional method or ASC.

In conclusion, there is not enough statistical evidence to conclude that one method is better than the other, either for the retention rate or academic achievement as measured by the final examination. We believe offering College Algebra in a computer-based instruction mode is a viable method of delivery and has many advantages. Additional research should be conducted which takes into consideration a different software package, the mathematical background of the students, and a treatment method that includes not only computer-based instruction, but also additional student-instructor contact time.

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FOOD HABITS OF THE CANEBRAKE RATTLESNAKE (CROTALUS HORRIDUS ATRICAUDATUS) IN CENTRAL GEORGIA

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ABSTRACT

Between July, 1997 and September, 2001 the digestive tracts of 77 canebrake rattlesnakes (Crotalus horridus atricaudatus) from seven central Georgia counties were examined for food items. Forty-five prey items were found in 42 snakes. Prey item data indicate a diet predominately of mammals (primarily rodents of the genera Sigmodon and Peromyscus), but amphibians, a reptile, and birds were also consumed. Several taxa are heretofore unreported prey of the canebrake rattlesnake.

Key words: Canebrake rattlesnake; Crotalus horridus atricaudatus; food habits, central Georgia.

INTRODUCTION

The canebrake rattlesnake (Crotalus horridus atricaudatus) is a common woodland snake in central Georgia, yet its food habits are poorly documented (1). Platt et al. (1) recently summarized the published dietary studies on the canebrake rattlesnake, and concluded its diet is predominantly small mammals with rodents being the most frequently reported prey. Reptiles and birds were reported as occasional prey. Here we report noteworthy information on the diet of C. h. atricaudatus from central Georgia including heretofore unreported prey.

MATERIALS AND METHODS

Between March 1997 and September 2001, the digestive tracts of 77 specimens of C. h. atricaudatus from central Georgia were examined for food items. Snakes were collected throughout from the following counties (Fig. 1): Baldwin (30 specimens); Hancock (7 specimens); Jones (7 specimens); Putnam (5 specimens); Twiggs (4 specimens); Washington (8 specimens); and Wilkinson (16 specimens). The Putnam County specimens represent the first record of C. h. atricaudatus from this county, filling a gap between Baldwin County to the south and Morgan County to the north (2). Specimens were obtained from a variety of sources, including snakes killed by hunters and rattlesnakes collected for consumption, but most specimens (76%) were obtained as automobile mortalities. As soon as we obtained the specimen, the alimentary tract was opened and its contents (if any)

were removed. Contents were identified on site to the lowest practical taxon, or were preserved in 10% formalin for later identification. The alimentary tracts of 35 snakes (45%) were empty and were excluded from further analysis. Three (7.1%) of the canebrakes containing food items had more than one prey item in their alimentary tract. In the cases where alimentary tracts contained only matted mammal hairs with no diagnostic bones present, it was not possible to identify the species or the number of individuals present. Microscopic examination of the hair masses suggested that all cases (n=9) represented rodent hairs rather than opossum, shrew, or mole hairs. Thus, digestive tracts that contained only matted fur were counted as containing a single unidentifiable rodent prey. Frequency of occurrence of prey species was determined by dividing the number of individuals of a particular prey item by the total number of prey items recovered from all digestive tracts. Most (90%) prey items were too badly decomposed to yield meaningful size or weight data, thus frequency of occurrence was used to suggest prey importance (1; 3). Specimens that were not badly damaged were deposited in the herpetological collections of Georgia College & State University. Abbreviations used include TL, total length, and SVL, snout-to-vent length.

Figure 1. Counties (shaded) of central Georgia where specimens of C. h. atricaudatus were collected.

RESULTS AND DISCUSSION

A total of 45 prey items were found in the alimentary tracts of 42 canebrake rattlesnakes, and included at least two amphibian, one reptile, two bird, and 13 mammal species (Table I). Mammals were the most common prey (Fig. 2), which is consistent with findings by others (e.g., 1; 4), but birds, reptiles, and amphibians were also occasionally taken (Fig. 2). Discussion of each class follows.

Table I. The number (n) and frequency of occurrence of prey items from the alimentary tracts of Crolatus horridus atricaudatus from Georgia.

Taxon	n	Frequency of Occurrence (%)
Amphibia		
Plethodontidae		
Eurycea cirrigera	1	2.2
Ranidae		
Rana sp. indet.	1	2.2
Reptilia		
Scincidae		
Eumeces fasciatus	1	2.2
Aves		
Troglodytidae		
Thryothorus ludovicianus	1	2.2
Bird family et genus indet.	1	2.2
Mammalia		
Didelphidae		
Didelphis virginiana	1	2.2
Soricidae		
Blarina carolinensis	2	4.4
Sciuridae		
Glaucomys volans	1	2.2
Sciurus carolinensis	1	2.2
Tamias striatus	1	2.2
Muridae		
Neotoma floridana	1	2.2
Ochrotomys nuttalli	1	2.2
Peromyscus sp. indet.	6	13.3
Reithrodontomys humulis	1	2.2
Sigmodon hispidus	13	28.9
Microtus pinetorum	1	2.2
Rattus sp. indet.	1	2.2
Rodent Hairs	9	20.0
Leporidae		
Sylvilagus sp. indet.	1	2.2

Total: 45

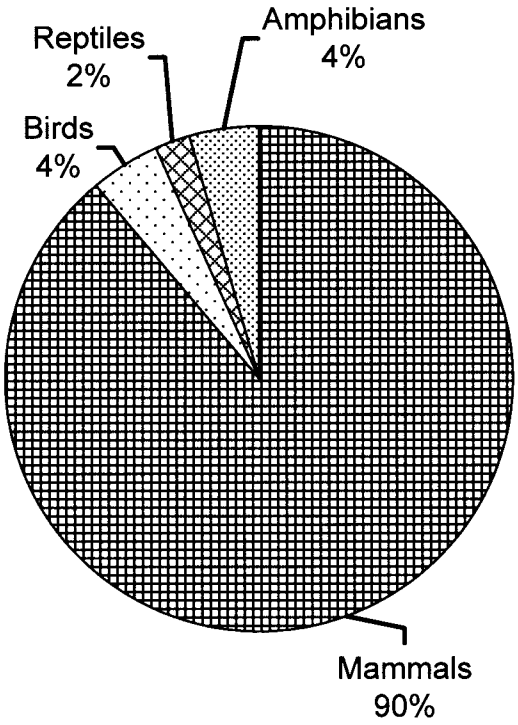

Figure 2. Relative percentages (rounded to nearest percent) of major classes of prey consumed by central Georgia C. h. atricaudatus.

Amphibians: Amphibians were found to constitute a small part of the diet of the central Georgia snakes examined (Fig. 2). A juvenile male (TL = 376 mm) snake from Wilkinson County contained a Rana sp. with a SVL of approximately 37 mm. The frog was too decomposed for accurate specific identification, but the area where the snake was collected is inhabited by R. catesbeiana, R. utricularia, and R. clamitans (5). Of these three species, R. catesbeiana is the only one that does not have a dorsolateral fold (5). The Rana prey clearly had a dorsolateral fold behind its head, thus is represented a juvenile specimen of either R. utricularia or R. clamitans. Another juvenile male (TL = 380 mm) snake from Baldwin County contained a complete and apparently recently eaten adult salamander (Eurycea cirrigera, TL = 58 mm). Uhler et al. (6) reported unidentified "frogs and other amphibians" in the diet of C. h. horridus, but to our knowledge the amphibians reported here are the first records of a frog and salamander in the diet of C. h. atricaudatus.

Reptiles: Reptiles represented an insignificant part of the diet of the central Georgia C. h. atricaudatus (Fig. 2) as only a single lizard was recovered. An adult Eumeces fasciatus (TL = 142 mm) was removed from the stomach of a juvenile (TL = 405 mm; sex not determined) C. h. atricaudatus from Wilkinson County. Although the coloration of the skink was quite faded, its scales were intact enough to determine it lacked the uniform ventral tail scales of E. inexpectatus and possessed four labial scales and two postlabial scales characteristic of E. fasciatus (5).

This is a common lizard in central Georgia (per. observ.). It is interesting to note that in a dietary study of viperid snakes from Chattacoochee County, Georgia, Hamilton and Pollack (4) reported a high occurrence (frequency of occurrence 23.1%) of lizards from the gut contents of C. h. atricaudatus. In a sample of only 29 snakes, they found three specimens of Cnemidophorus sexlineatus, two of Scincella lateralis, and one of Eumeces laticeps. Thus it appears that lizards can be important prey items in the diet of C. h. atricaudatus.

Birds: Platt et al. (1) noted that birds made up a "relatively minor portion of the diet of C. h. atricaudatus, and the bobwhite quail is the most frequently consumed species." Similarly, birds were also found to represent a small portion of the diet of central Georgia C. h. atricaudatus (Fig. 2) as only two individuals were found. A well preserved adult Carolina Wren (Thryothorus ludovicianus) was found in the stomach of an adult (TL = 987 mm) female canebrake from Baldwin County. This is the first record of a Carolina Wren taken as prey by C. h. atricaudatus (see Table I in Platt et al., 1). Also, the feather remains of an unidentified passerine-like bird were found in the lower alimentary tract of an adult (TL = 1102 mm) female canebrake from Hancock County. Although we were unable to more specifically identify the remains, the feathers were from a bird larger than the Carolina Wren. In both cases, these were the only prey items in each snake.

Mammals: Mammals were the most common prey recovered representing 90.0% of all prey items (Fig. 2). Mammals also were the most diverse prey taken by the canebrakes with five families and 13 species represented (Table I). Rodents constituted 80% of all prey items recovered. Of the mammal prey identified to at least genus, the rodents Sigmodon hispidus and Peromyscus sp. showed the highest frequency of occurrence (42.2% collectively; Table I). Platt et al. (1) found S. hispidus to be the most frequently reported small rodent prey (frequency of occurrence 15.2, n = 92) for C. h. atricaudatus. Mammals obtained in this study heretofore unreported as food items for C. h. atricaudatus include (see Table 1 in Platt et al., 1): the marsupial Didelphis virginiana; the shrew Blarina carolinesis; the flying squirrel Glaucomys volans, the chipmunk Tamias striatus; and the rodents Ochrotomys nuttalli, Reithrodontomys humulis, and Microtus pinetorum.

Platt et al. (1) did not include Neotoma floridana or Rattus sp. in their list of known food items of C. h. atricaudatus, but noted as we do here that Allen and Neil (7) reported unquantified records of these taxa as canebrake prey items. A single individual of each taxon was found as prey in the central Georgia snakes (Table I). The Neotoma floridana was found in the stomach of an adult (TL=960 mm) female snake from Baldwin County, and the Rattus sp. in the stomach of an adult (TL = 1080 mm) female snake from Wilkinson County. The opossum (Didelphis virginiana) was recovered from the stomach of an adult (TL = 968 mm) female snake from Jones County. Although the opossum was badly decomposed, it was determined to be a juvenile individual. One of the shrews (Blarina carolinensis) was taken by a young adult (TL = 844 mm) female snake from Wilkinson County that also contained unidentifiable rodent fur in its lower alimentary track. The other shrew was taken by a juvenile snake (TL - 264 mm, sex undetermined) from Baldwin County. Three species of squirrels were taken as prey by the cane-

brakes (Table I), with the most interesting being an adult flying squirrel (Glaucomys volans). The flying squirrel was found in the stomach of a large adult (TL - 1280 mm) male snake from Baldwin County. While the flying squirrel has not been previously reported in the diet of C. h. atricaudatus (1), Savage (8) reported it in the diet of C. h. horridus. A single golden mouse (Ochrotomys nuttalli) was found in the stomach of an adult (TL = 1048 mm) female snake from Baldwin County. The mouse apparently had just been eaten before the snake was killed as its ochreous-colored pelage was still bright. In fact, it would be beneficial to know how fast this mouse loses its pelage color after being ingested by a snake as once the fur color fades, this taxon could easily be mistaken for the closely related genus (if not congeneric) Peromyscus. A single Reithrodontomys humulis was identified by the presence of a partial skull which retained two grooved incisors characteristic of this small mouse (9). The skull was found in a small mass of rodent fur in a juvenile (TL = 396 mm) male snake from Baldwin County.

SUMMARY

The analysis of food items recovered from 42 specimens of central Georgia C. h. atricaudatus indicates that the species preyed predominantly on mammals (Fig. 2) with small to medium-sized rodents being the most frequently taken prey. The most frequently consumed rodents were Sigmodon hispidus and Peromyscus sp. (Table I). These findings are consistent with findings by others (see discussion in Platt et al., 1). An opossum and a shrew (Blarina carolinensis) were also found as prey. Amphibian, reptile, and bird prey constituted only a small portion of the canebrakes' diet (about 10% collectively). Several taxa were previously unreported as C. h. atricaudatus prey including two amphibians, one reptile, and seven mammals.

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